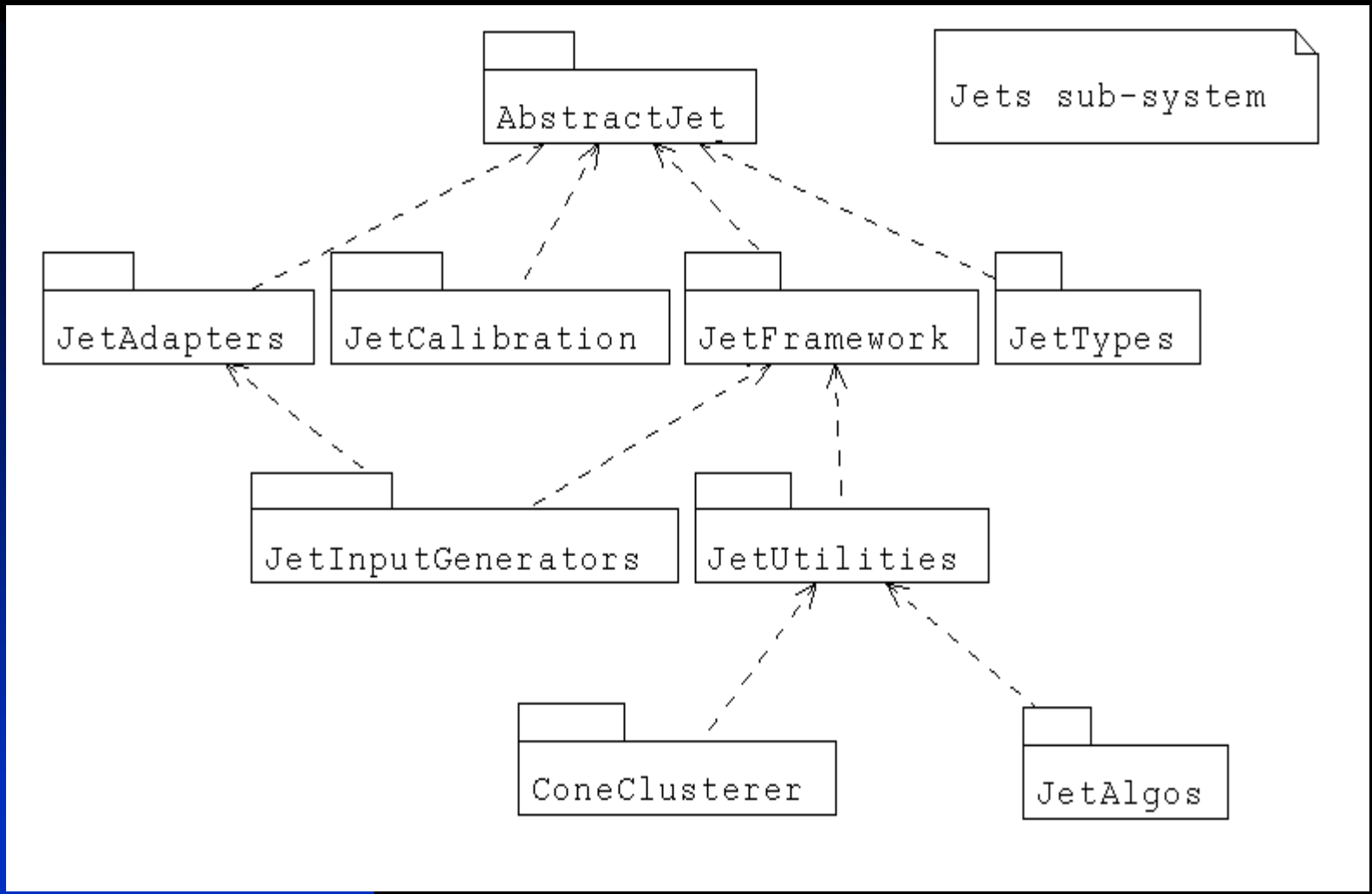
Jets: Re-packaging and new jet-algorithms

J.P. Wellisch, Jet/MET meeting, 10 Oct 2001

Re-packaging

- Too much code in one package makes parallel development quite difficult
- No particular reason to package for example calibrations with jet-algorithms or specific ways to define input collections


AbstractJet
Jets sub-system
JetAdapters
JetCalibration
JetFramework
JetTypes
JetInputGenerators
JetUtilities
ConeClusterer
JetAlgos

Jet algorithms

- ‘Heavy ion’ algorithm as reported last time
- A look at the CMS run II suggestions, in particular for cone algorithms
  - Attributes of algorithms
  - Recombination schemes
  - Seed-less jets

Attributes of a jet algorithm

- Fully specified, including eventual splitting and merging, etc..
- Collinear and infrared safe
- Detector independent
- Order independent, I.e. work on detectors, particles, partons, etc..
- Lorentz invariant
- Insensitive to detail of the final state
- Straightforward implementation

More attributed of an ideal algorithm

- Minimum biases
- Stable against pile-up
- CPU effective
- Good reconstruction efficiency
- Easy to calibrate
- Easy to use

Recombination schemes

- Snow-mass scheme
  - E_t weighting of eta, phi
- E-scheme (RUN-II suggestion)
  - 4-vector summing
- RUN-I schemes
  - Mixed use of both

Seed-less cone jets

- Take all possible seed candidates, and allow cones around them to float until they are stable
- Only then sort out, which are actual jets, and which are duplicates
  - ➔ Infrared safe
  - ➔ Very CPU expensive

Almost seed-less cone-jets (approximates RUN-II suggested algo)

- Take all candidates above seed threshold
- Take all directions that are 4-vector sums of these directions, to make it collinear safe
- ‘Float’ the jets to stability
- Skip, if initial direction outside the jet-cone
- Merge/split based on overlap and closeness to jet-center

This is the MidPointConeAlgorithm

- Designed (under the aspect to try to use STL algorithms in an analysis situation to simplify the code)
- Coded, using 4-vector recombination
- Testing delayed (by lumbago) but first tests have been run successfully.
- Documentation to be written.

(Note that we also have an E_SchemeJet now)